

REMARKS

The Final Office Action mailed February 13, 2001, has been received and reviewed. Claims 25, 26, 31 through 34, 37 through 40, and 43 through 49 are currently pending in the application. Claims 25, 26, 31 through 34, 37 through 40, and 43 through 49 stand rejected. Applicants respectfully request reconsideration of the application in light of the remarks included herein.

Objections

The Amendment filed on November 28, 2000 is objected to in the Final Office Action because the Amendment assertedly introduced new matter. (*Final Office Action*, page 2). Specifically, it is asserted that the “free of field oxide structure” limitation added by the Amendment is not supported by the original disclosure. Though it is true that an issue of new matter will arise if an applicant amends or attempts to amend the abstract, specification or drawings of an application to include matter not described in the application as it was filed, information contained in any one of the specification, claims, or drawings of the as-filed application may be added to any other part of the application without introducing new matter. *M.P.E.P.* § 2163.06. In this case the matter objected to in the Office Action is fully supported by the as-filed specification of the present application, and Applicants respectfully submit that amending the claims to include the subject matter objected to is entirely appropriate.

The claims pending in the present application recite pre-anneal intermediate structures including semiconductor substrates free of field oxide structures. Such structures are clearly and completely described by the “Detailed Description of the Preferred Embodiments” section and the figures provided in the as-filed specification of the present application. Applicants first respectfully direct the Examiner’s attention to the method and structures described in page 7 of the original specification of the present application. As described in page 7, the pre-anneal structures of the present invention include each of the limitations recited in the pending claims, and, in particular, are free from field oxide structures. That this is true is highlighted by references to original FIG. 1 through original FIG. 4. Moreover, as is easily appreciated by reference to page 8 of the original specification, field oxide structures are not created on the semiconductor substrate until after the pre-anneal intermediate structure has undergone an

annealing step. Therefore, Applicants respectfully submit that the amendments entered by the Amendment filed on November 28, 2000 are fully supported by the contents of the present application as it was originally filed, and Applicants respectfully request that the new matter objection be withdrawn.

35 U.S.C. § 112 Claim Rejections

Claims 25, 26, 31 through 34, 37 through 40 and 43 through 49 stand rejected under 35 U.S.C. § 112 (Section 112), first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicants respectfully traverse this rejection, as hereinafter set forth. Specifically, it is asserted that “[t]here does not appear to be a written description of the claim limitation ‘free of field oxide structures’ in the application as filed.” (*Final Office Action*, page 2). Applicants, however, respectfully traverse this rejection as hereinafter set forth.

Applicants respectfully submit that the limitation at issue is fully supported by the written description provided in the original specification. As set forth in M.P.E.P. § 2163.02, the “objective standard for determining compliance with the written description requirement is, ‘does the description clearly allow persons of ordinary skill in the art to recognized that he or she invented what is claimed.’” *See, In re Gosteli*, 872 F.2d 1008, 1012, 10 U.S.P.Q.2d 1614, 1618 (Fed. Cir. 1989). Significantly, “[t]he subject matter of the claim need not be described literally (i.e., using the same terms or *in haec verba*) in order for the disclosure to satisfy the description requirement.” M.P.E.P. § 2163.02. In fact, drawings alone may provide written description sufficient to comply with requirements of Section 112, first paragraph. *See, Vas-Cath, Inc. v. Marhukar*, 935 F.2d 1555, 1563-64, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991). In this instance, Applicants respectfully submit that the subject matter set forth in both the figures and the “Detailed Description of the Preferred Embodiments” section of the application as-filed clearly allows persons of ordinary skill in the art to recognize that the inventors invented the subject matter recited in the rejected claims

The original specification describes in great detail pre-anneal intermediate structures which are free of field oxide structures. As has already been detailed, such description is provided by the subject matter set forth in pages 7 and 8 of the "Detailed Description of the Preferred Embodiments" section, as well as in FIG. 1 through FIG. 4 of the original specification. Applicants respectfully submit, therefore, that the original specification of the instant application clearly conveys to those of ordinary skill in the art that the inventors had possession of the subject matter recited within the rejected claims at the time the application was filed. Consequently, Applicants further submit that the rejection of claims 25, 26, 31 through 34, 37 through 40 and 43 through 49 under Section 112, first paragraph, is inappropriate and request that it be withdrawn.

35 U.S.C. § 103(a) Obviousness Rejections

Each of pending claims 25, 26, 31 through 34, 37 through 40, and 43 through 49 stands finally rejected under 35 U.S.C. § 103(a) ("Section 103") as being unpatentable over one of various combinations of Tada (U.S. Patent No. 5,545,577), Koike (U.S. Patent No. 5,874,325), and Shim et al. (U.S. Patent No. 5,846,596). A rejection under Section 103(a), however is improper and will be overturned unless a *prima facie* case of obviousness is established against the rejected claims. *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). Applicants respectfully submit that none of the combinations of references cited in the Final Office Action provides evidence sufficient to properly establish the *prima facie* obviousness of any of the pending claims and, thus, Applicants respectfully request that the rejections of claims 25, 26, 31 through 34, 37 through 40, and 43 through 49 under Section 103 be withdrawn.

As is set forth in M.P.E.P. 706.02(j), a *prima facie* case of obviousness under Section 103 can not be established unless three criteria are met:

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The

teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) (emphasis added).

The examiner bears the burden of establishing these three criteria based on the prior art, and, significantly, this burden can be met “only by showing some **objective teaching** in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references.” *In re Fritch*, 972 F.2d 1260, 1265, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992) (emphasis added).

Furthermore, it is essential to appreciate that each of the three criteria necessary for establishing *prima facie* obviousness must be evaluated independently. A combination of references will not render the subject matter recited in a claim obvious merely because the combination teaches all of the elements recited in the rejected claim. *See, e.g., Micro Chemical, Inc. v. Great Plains Chemical, Inc.*, 103 F.3d 1538, 41 U.S.P.Q.2d (Fed. Cir. 1997); *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). For example the fact that a device or method was “‘obvious to try’ does not show that there was a reasonable expectation of success.” *Amgen, Inc. v. Chugai Pharmaceutical Co., Ltd.*, 927 F.2d 1200, 1207, 18 U.S.P.Q.2d 1016 (Fed. Cir. 1991) (quoting *In re Dow Chemical Co.*, 837 F.2d 469, 473, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988)). Therefore, even if a combination of references teaches all of the elements recited in a rejected claim, and even if the combined references reveal to the ordinarily skilled artisan a reasonable expectation of success in creating or carrying out the claimed subject matter, that claim can not be properly rejected under Section 103 unless the combined teachings of the cited references would **also** suggest or motivate one of ordinary skill in the art to create the subject matter recited in the rejected claim. Merely establishing one or two of the criteria essential for demonstrating *prima facie* obviousness does not set a proper foundation for a rejection under Section 103(a).

I. Subject Matter Recited in Pending Claims

Claim 25 is an independent claim reciting “[a] pre-anneal intermediate structure in the formation of an isolation structure for a semiconductor device.” The structure recited in claim 25 comprises:

- a semiconductor substrate free of field oxide structures and having a first surface and a second surface, said first surface opposing said second surface;
- at least one p-well and at least one n-well on said substrate first surface;
- at least one p-type area within said at least one n-well;
- at least one n-type area within said at least one p-well; and
- a substantially dopant-free, uninterrupted diffusion barrier layer extending over said first surface and said second surface of said semiconductor substrate.

Therefore, in order to establish the *prima facie* obviousness of claim 25 or claims 26, 31, and 32, which depend from claim 25, the Office must show that one of ordinary skill in the art would find suggestion or motivation in the prior art to create a structure that at least includes all of the limitations recited in claim 25.

Claim 33 is an independent claim and also recites a pre-anneal intermediate structure.

The pre-anneal intermediate structure of claim 33 includes:

- a semiconductor substrate free of field oxide structures and having a first surface and a second surface, said first surface opposing said second surface;
- at least one p-well and at least one n-well on said substrate first surface;
- at least one doped area within at least one of said at least one n-well and said at least one p-well; and
- a substantially dopant-free, uninterrupted diffusion barrier layer extending over said first surface and said second surface of said semiconductor substrate.

Thus, in order to establish the *prima facie* obviousness of claim 33 or claims 34, 37, and 38, which depend from claim 33, the Office must show that one of ordinary skill in the art would find suggestion or motivation in the prior art to create a structure that at least includes all of the limitations recited in claim 33.

Claim 39 is yet another independent claim reciting a pre-anneal intermediate structure.

The pre-anneal intermediate structure of claim 39 comprises:

- a semiconductor substrate free of field oxide structures and having a first surface and a second surface, said first surface opposing said second surface;
- at least one first doped area on said substrate first surface;

at least one second, differently doped area within said at least one first doped area;
and
a substantially dopant-free, uninterrupted diffusion barrier layer extending over
said first surface and said second surface of said semiconductor substrate.

Thus, in order to establish the *prima facie* obviousness of claim 39 or claims 40 and 43 through 45, which depend from claim 39, the Office must show that one of ordinary skill in the art would find suggestion or motivation in the prior art to create a structure that at least includes all of the limitations recited in claim 39.

Finally, claim 46 is also an independent claim reciting a pre-anneal intermediate structure. The structure recited in claim 46 includes:

a semiconductor substrate that is free of field oxide structures and includes a first surface and a second surface, said first surface opposing said second surface;
at least one p-well and at least one n-well defined on said first surface of said substrate;
at least one p-type area defined within said at least one n-well;
at least one n-type area defined within said at least one p-well; and
a substantially dopant-free, uninterrupted diffusion barrier layer extending over said first surface and said second surface, said substantially dopant-free, uninterrupted diffusion barrier layer encapsulating said semiconductor substrate.

Thus, before the *prima facie* obviousness of either claim 46 or claims 47 through 49, which depend from claim 46, can be established, the Office must show that one of ordinary skill in the art would find suggestion or motivation to create a structure that at least includes each of the limitations recited in claim 46.

✧ Applicants respectfully emphasize that the substantially dopant-free, uninterrupted diffusion barrier layer and lack of field oxide structures in the pre-anneal intermediate structures recited in the pending claims are of significance. Because the pre-anneal structures recited in the pending claims include a substantially dopant-free, uninterrupted diffusion barrier layer, such structures substantially reduce or eliminate dopant contamination of process equipment or other intermediate structures present during a subsequent anneal step. (*See, Specification*, pp. 8). Further, as is taught and illustrated in the present application, creation of device areas and field isolation structures after forming and annealing the pre-anneal intermediate structures recited in

the pending claims substantially reduces encroachment of field isolation structures into the device areas. (*See, Specification*, pp. 9, 10; FIG. 9 - FIG. 12).

II. The References Cited in the Final Office Action do not Establish the *Prima Facie* Obviousness of the Pending Claims

Applicants respectfully submit that the combined teachings of the references cited in the Final Office Action do not even consider the concerns addressed by the structures recited in the pending claims, much less motivate one of ordinary skill in the art to resolve such concerns by creating pre-anneal intermediate structures having the characteristics recited in the pending claims. As a consequence, Applicants further submit that the combined teachings of the references cited in the Final Office Action can not establish the *prima facie* obviousness of the claims pending in the present application, and Applicants respectfully request that each of the rejections contained in the Final Office Action be withdrawn.

1. *The combined teachings of Tada and Koike do not establish the prima facie obviousness of claims 25, 26, and 31*

Applicants respectfully submit that the combined teachings of Tada and Koike do not provide the suggestion or motivation necessary to establish the *prima facie* obviousness of claim 25, claim 26, or claim 31. Each of claims 25, 26, and 31 recites a pre-anneal intermediate structure including a semiconductor substrate that is free of field oxide structures and has first and second opposing surfaces, at least one p-well and at least one n-well on the substrate first surface, at least one p-type area within the at least one n-well, at least one n-type area in the at least one p-well, and a substantially dopant-free, uninterrupted diffusion barrier layer extending over both the first and second surfaces of the semiconductor substrate. Though Tada and Koike disclose various semiconductor structures, nothing in the combined teachings of these two references would suggest or motivate one of ordinary skill in the art to create the subject matter recited in any of claims 25, 26, or 31.

It is highlighted in the Final Office Action that Tada does not teach a substantially dopant-free, uninterrupted diffusion barrier layer that extends over first and second opposing surfaces of a semiconductor substrate. (*Final Office Action*, page 3-9). Moreover, Applicants respectfully submit that Tada does not contemplate the use of such a structure. Thus, Applicants

further submit that the teachings of Tada could not motivate one of ordinary skill in the art to address the issues of field oxide encroachment or dopant contamination of process machinery by forming a dopant-free diffusion barrier layer around any type of pre-anneal intermediate structure.

Moreover, Though Koike teaches an intermediate semiconductor structure including a dopant free silicon nitride layer extending over first and second opposing sides of the intermediate structure, Applicants respectfully submit that the combined teachings of Koike and Tada would not motivate one of ordinary skill in the art to create a pre-anneal intermediate structure as recited in any one of claims 25, 26, and 31. Applicants respectfully emphasize that the silicon nitride film formed over the structure taught in Koike is substantially compromised during the formation of field oxide regions and then entirely removed before first and second doped areas are formed on the semiconductor substrate. (*See, Koike*, col. 7 and FIG. 13 - FIG. 14). Koike, therefore, teaches away from the intermediate structures recited in claims 25, 26, and 31. In addition, Applicants respectfully submit that one of ordinary skill in the art would find nothing in the combined teachings of Koike and Tada that indicates the benefits to be realized through the formation of a pre-anneal structure including one or more doped areas as well as a substantially dopant-free, uninterrupted diffusion barrier layer extending over first an second opposing sides of the structure. Thus, Applicants respectfully submit that when considering the combined teachings of Tada and Koike in their entirety, as the Office is required to do (*M.P.E.P.* § 2140), the ordinarily skilled artisan would find no suggestion or motivation to combine aspects of the structures disclosed in Tada and Koike to create a device having all of the limitations recited in any one claims 25, 26, or 31.

It is asserted in the Final Office Action that “[i]t would have been obvious to one having ordinary skill in the art at the time . . . the invention was made to form the substantially dopant-free barrier layer of Tada extending over the first and second surface as taught by Koike to prevent the second surface from oxidizing” (*See, e.g., Final Office Action*, page 3); but Applicants respectfully submit that such an assertion is not supported by objective evidence. In particular, the Final Office Action does not include evidence that one of ordinary skill in the art would find suggestion or motivation to create a substantially dopant-free, uninterrupted diffusion

barrier layer over first and second surfaces of an intermediate structure having each of the limitations included in any one of the rejected claims. Therefore, applicants respectfully submit that such an argument constitutes an impermissible hindsight reconstruction.

2. *The combined teachings of Tada, Koike, and Shim et al. do not establish the prima facie obviousness of claim 32*

Applicants respectfully submit that the combined teachings of Tada, Koike, and Shim et al. do not provide the requisite suggestion or motivation to establish the *prima facie* obviousness of claim 32. Claim 32 recites a pre-anneal intermediate structure including a semiconductor substrate, which is free of field oxide structures and has first and second opposing surfaces, at least one p-well and at least one n-well on the substrate first surface, at least one p-type area within the at least one n-well, at least one n-type area in the at least one p-well, and a substantially dopant-free, uninterrupted diffusion barrier layer extending over both the first and second surfaces of the semiconductor substrate. Though Tada, Koike, and Shim et al. disclose various semiconductor structures, nothing in the combined teachings of these two references would suggest or motivate one of ordinary skill in the art to create the subject matter recited claim 32.

As was detailed with regard to the rejection of claims 25, 26, and 31, the combined teachings of Tada and Koike would not provide one of ordinary skill in the art with the requisite suggestion or motivation to create a structure including a semiconductor substrate that is free of field oxide structures and has first and second opposing surfaces, at least one p-well and at least one n-well on the substrate first surface, at least one p-type area within the at least one n-well, at least one n-type area in the at least one p-well, and a substantially dopant-free, uninterrupted diffusion barrier layer extending over both the first and second surfaces of the semiconductor substrate. Applicants further submit that the teachings of Shim et al. do not combine with the teachings of Tada and/or Koike to provide the requisite suggestion or motivation to combine. Shim et al. teaches a method of forming field oxide isolation regions having sloped edges. During the process taught by Shim et al., oxide layers and non-oxidative nitride layers are formed over the semiconductor substrate surface. However, the only method taught in Shim et al. requires the formation a field oxide structure which defines areas on the surface of a

semiconductor substrate which are to be **subsequently** doped. (See, *Shim et al.*, col. 3. Lines 26-32). Moreover, Shim et al. is devoid of any teaching or suggestion that would motivate one of ordinary skill in the art to form a diffusion barrier layer over the semiconductor substrate before an annealing step. Thus, like Koike, Shim et al. teaches away from the structures recited in the rejected claims, and, as a consequence, Applicants respectfully submit that when the combined teachings of Tada, Koike and Shim et al. are considered in their entirety, such teachings would not suggest or motivate the creation of an intermediate structure having all of the limitations recited claim 32.

3. *The combined teachings of Tada and Koike do not establish the prima facie obviousness of claims 33, 34, 37, and 38*

Applicants respectfully submit that the combined teachings of Tada and Koike do not provide the suggestion or motivation necessary to establish the *prima facie* obviousness of any of claims 33, 34, 37, or 38. Each of these claims recites a pre-anneal intermediate structure including a semiconductor substrate, which is free of field oxide structures and has first and second opposing surfaces, at least one p-well and at least one n-well on the substrate first surface, at least one doped area within at least one of the at least one n-well and the at least one p-well, and a substantially dopant-free, uninterrupted diffusion barrier layer extending over said first surface and said second surface of said semiconductor substrate. Though Tada and Koike disclose various semiconductor structures, nothing in the combined teachings of these two references would suggest or motivate one of ordinary skill in the art to create the subject matter recited in claims 33, 34, 37, and 38.

As is previously detailed with respect to claims 25, 26, and 31, the combined teachings of Tada and Koike do not suggest or motivate the formation of a pre-anneal structure that includes a semiconductor substrate having at least one doped area thereon as well as a substantially dopant-free, uninterrupted diffusion barrier layer extending over first and second opposing sides of the semiconductor substrate. First, the teachings of Tada not only fail to teach a substantially dopant-free, uninterrupted diffusion barrier layer extending over first and second opposing surfaces of a semiconductor substrate (*Final Office Action*, page 3-9), but Applicants respectfully emphasize that Tada does not contemplate the use or formation of such a structure. Additionally,

though Koike teaches an intermediate semiconductor structure including a dopant free silicon nitride layer extending over first and second opposing sides of the intermediate structure, Applicants respectfully submit that Koike teaches away from the intermediate structure recited in the claims 33, 34, 37, and 38 (*See, Koike*, col. 7 and FIG. 13 - FIG. 14). Thus, Applicants respectfully submit that the combined teachings of Tada and Koike could not provide the ordinarily skilled artisan with the suggestion or motivation required to establish the *prima facie* obviousness of claims 33, 34, 37, and 38.

With respect to claims 33, 34, 37 and 38, it is asserted in the Final Office Action that “[i]t would have been obvious to one having ordinary skill in the art at the time . . . the invention was made to form the substantially dopant-free barrier layer of Tada extending over the first and second surface as taught by Koike to prevent the second surface from oxidizing” (*See, e.g., Final Office Action*, page 5), but Applicants respectfully submit that such an assertion is not supported by objective evidence. In particular, the Final Office Action does not include evidence that one of ordinary skill in the art would find suggestion or motivation to create a substantially dopant-free, uninterrupted diffusion barrier layer over first and second surfaces of an intermediate structure having each of the limitations included in any one of the rejected claims. Therefore, applicants respectfully submit that such an argument constitutes an impermissible hindsight reconstruction.

4. *The combined teachings of Tada and Koike do not establish the prima facie obviousness of claims 39, 40, and 43 through 45*

Applicants respectfully submit that the combined teachings of Tada and Koike do not provide the requisite suggestion or motivation to establish the *prima facie* obviousness of any of claims 39, 40, and 43 through 45. Each of these claims recites a pre-anneal intermediate structure including a semiconductor substrate that is free of field oxide structures and has first and second opposing surfaces, at least one doped area on said substrate first surface, at least one second, differently doped area within said at least one first doped area, and substantially dopant-free, uninterrupted diffusion barrier layer extending over said first surface and said second surface of said semiconductor substrate. Though Tada and Koike disclose various semiconductor structures, nothing in the combined teachings of these two references would

suggest or motivate one of ordinary skill in the art to create the subject matter recited in claims 39, 40, and 43 through 45.

As is previously detailed with respect to claims 25, 26, and 31, the combined teachings of Tada and Koike do not suggest or motivate the formation of a pre-anneal structure that includes a semiconductor substrate having at least one doped area thereon as well as a substantially dopant-free, uninterrupted diffusion barrier layer extending over first and second opposing sides of the semiconductor substrate. First, the teachings of Tada not only fail to teach a substantially dopant-free, uninterrupted diffusion barrier layer extending over first and second opposing surfaces of a semiconductor substrate (*Final Office Action*, page 3-9), but Applicants respectfully emphasize that Tada does not contemplate the use or formation of such a structure. Additionally, though Koike teaches an intermediate semiconductor structure including a dopant free silicon nitride layer extending over first and second opposing sides of the intermediate structure, Applicants respectfully submit that Koike teaches away from the intermediate structure recited in claims 39, 40, and 43 through 45 (*See, Koike*, col. 7 and FIG. 13 - FIG. 14). Thus, Applicants respectfully submit that the combined teachings of Tada and Koike could not provide the ordinarily skilled artisan with the suggestion or motivation required to establish the *prima facie* obviousness of claims 39, 40, and 43 through 45.

With respect to claims 39, 40, and 43 through 45, it is asserted in the Final Office Action that "[i]t would have been obvious to one having ordinary skill in the art at the time . . . the invention was made to form the substantially dopant-free barrier layer of Tada extending over the first and second surface as taught by Koike to prevent the second surface from oxidizing" (*See, e.g., Final Office Action*, page 7), but Applicants respectfully submit that such an assertion is not supported by objective evidence. In particular, the Final Office Action does not include evidence that one of ordinary skill in the art would find suggestion or motivation to create a substantially dopant-free, uninterrupted diffusion barrier layer over first and second surfaces of an intermediate structure having each of the limitations included in any one of the rejected claims. Therefore, applicants respectfully submit that such an argument constitutes an impermissible hindsight reconstruction.

5. *The combined teachings of Tada and Koike do not establish the prima facie obviousness of claims 46 through 48*

Applicants respectfully submit that the combined teachings of Tada and Koike do not provide the requisite suggestion or motivation to establish the *prima facie* obviousness of any of claims 46 through 48. Each of these claims recites a pre-anneal intermediate structure including a semiconductor substrate, which is free of field oxide structures and has first and second opposing surfaces, at least one p-well and at least one n-well defined on the first surface of the semiconductor substrate, at least one p-type area defined within the at least one n-well, at least one n-type area defined within the at least one p-well, and a substantially dopant-free, uninterrupted diffusion barrier layer extending over and encapsulating the semiconductor substrate. Though Tada and Koike disclose various semiconductor structures, nothing in the combined teachings of these two references would suggest or motivate one of ordinary skill in the art to create the subject matter recited in claims 46 through 48.

As is previously detailed with respect to claims 25, 26, and 31, the combined teachings of Tada and Koike do not suggest or motivate the formation of a pre-anneal structure that includes a semiconductor substrate having at least one doped area thereon as well as a substantially dopant-free, uninterrupted diffusion barrier layer extending over or encapsulating opposing sides of the semiconductor substrate. First, the teachings of Tada not only fail to teach a substantially dopant-free, uninterrupted diffusion barrier layer extending over first and second opposing surfaces of a semiconductor substrate (*Final Office Action*, page 3-9), but Applicants respectfully emphasize that Tada does not contemplate the use or formation of such a structure. Additionally, though Koike teaches an intermediate semiconductor structure including a dopant free silicon nitride layer extending over first and second opposing sides of the intermediate structure, Applicants respectfully submit that Koike teaches away from the intermediate structure recited in claims 46 through 48. (See, *Koike*, col. 7 and FIG. 13 - FIG. 14). Thus, Applicants respectfully submit that the combined teachings of Tada and Koike could not provide the ordinarily skilled artisan with the suggestion or motivation required to establish the *prima facie* obviousness of claims 46 through 48.

With respect to claims 46 through 48, it is asserted in the Final Office Action that “[i]t would have been obvious to one having ordinary skill in the art at the time . . . the invention was made to form the substantially dopant-free barrier layer of Tada extending over the first and second surface as taught by Koike to prevent the second surface from oxidizing”(See, e.g., *Final Office Action*, page 8), but Applicants respectfully submit that such an assertion is not supported by objective evidence. In particular, the Final Office Action does not include evidence that one of ordinary skill in the art would find suggestion or motivation to create a substantially dopant-free, uninterrupted diffusion barrier layer over first and second surfaces of an intermediate structure having each of the limitations included in any one of the rejected claims. Therefore, applicants respectfully submit that such an argument constitutes an impermissible hindsight reconstruction.

6. *The combined teachings of Tada, Koike, and Shim et al. do not establish the prima facie obviousness of claim 49*

Applicants respectfully submit that the combined teachings of Tada, Koike, and Shim et al. do not provide the requisite suggestion or motivation to establish the *prima facie* obviousness of claim 49. Claim 49 recites a pre-anneal intermediate structure including a semiconductor substrate, which is free of field oxide structures and has first and second opposing surfaces, at least one p-well and at least one n-well on the substrate first surface, at least one p-type area within the at least one n-well, at least one n-type area within the at least one p-well, and a substantially dopant-free, uninterrupted diffusion barrier layer extending over and encapsulating the semiconductor substrate. Though Tada and Koike and Shim et al. disclose various semiconductor structures, nothing in the combined teachings of these two references would suggest or motivate one of ordinary skill in the art to create the subject matter recited claim 49.

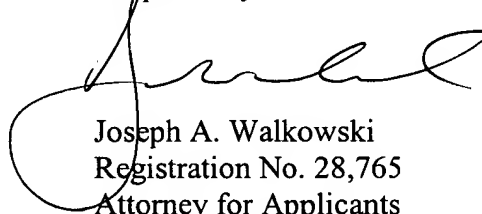
As was discussed with regard to the rejection of claims 46 through 48, the combined teachings of Tada and Koike would not provide one of ordinary skill in the art with the requisite suggestion or motivation to create a structure including a semiconductor substrate that is free of field oxide structures and has first and second opposing surfaces, at least one p-well and at least one n-well on the substrate first surface, at least one p-type area within the at least one n-well, at least one n-type area in the at least one p-well, and a substantially dopant-free, uninterrupted

diffusion barrier layer extending over and encapsulating the semiconductor substrate. Applicants further submit that the teachings of Shim et al. do not combine with the teachings of Tada and/or Koike to provide the requisite suggestion or motivation to combine. Shim et al. teaches a method of forming field oxide isolation regions having sloped edges. During the process taught by Shim et al., oxide layers and non-oxidative nitride layers are formed over the semiconductor substrate surface. However, the only method taught in Shim et al. requires the formation a field oxide structure which defines areas on the surface of a semiconductor substrate which are to be **subsequently** doped. (*See, Shim et al.*, col. 3. Lines 26-32). Moreover, Shim et al. is devoid of any teaching or suggestion that would motivate one of ordinary skill in the art to form a diffusion barrier layer over the semiconductor substrate before an annealing step. Thus, like Koike, Shim et al. teaches away from the structures recited in the rejected claims, and, as a consequence, Applicants respectfully submit that when the combined teachings of Tada, Koike and Shim et al. are considered in their entirety, such teachings would not suggest or motivate the creation of an intermediate structure having all of the limitations recited in claim 49.

CONCLUSION

Applicants respectfully request that the rejections of claims 25, 26, 31 through 34, 37 through 40, and 43 through 49 under Section 103(a) be withdrawn. The combined teachings of the references cited against the rejected claims would not provide the requisite suggestion or motivation to create a pre-anneal intermediate structure having all the limitations recited in any one of claims 25, 26, 31 through 34, 37 through 40, and 43 through 49, particularly when the teachings of the cited references are considered in their entirety. Applicants, therefore, respectfully submit that claims 25, 26, 31 through 34, 37 through 40, and 43 through 49 are in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully Submitted,



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